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ABSTRACT

A study evaluated the effectiveness of a parent education program in increasing school readiness in poor and high-needs children. Participants in the Parents and Children Together program (PACT) of Binghamton, New York, receive home visits from trained and certified parent educators, beginning when a child is born and continuing until he or she is 3 years old. The parent educators provide information about child development and parenting, and refer parents to other agencies when needed. The program also provides developmental screening tests, parent group meetings, and a lending library of child development sources and age-appropriate toys. Subjects for this program evaluation were twenty 4- and 5-year-old graduates of the PACT program and a matched control group of 20 children whose families had not participated in the program. The cognitive, language, and physical development of the PACT graduates was compared with that of the control subjects. Results indicated that the experimental group had significantly higher scores on all measures than did the control group. The following year, kindergarten screening and readiness test scores, as well as kindergarten attendance, grades, and special education referrals from all program participants were compared to those of all other children entering first grade. Again, program participants showed superior performance. Regression analyses of performance models showed higher coefficients for program participation than for other preschool experiences such as Head Start or private preschool attendance. A cost-benefit analysis showed evidence of substantial financial savings in implementation of the PACT program. (HTH)

DRAFT

# Raising Reading Readiness in Low-Income Children by Parent Education

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Abstract

This study evaluated the effectiveness of a parental education program involving parents of children from birth to 3 years old in increasing school readiness in poor and high-needs children. The cognitive, language, and physical development of the 20 oldest and neediest program participants at age 4-5 was compared to controls matched for family income, educational experience, race, sex, and other risk factors. The experimental group had significantly higher scores on all measures; as well, there were fewer cases of suspected child abuse and neglect. Although the experimental group had a higher proportion of welfare dependence than controls when the children were babies, by the time of the study this situation had reversed itself. The following year, kindergarten screening and readiness test scores, and kindergarten attendance, grades, and special education referrals for all program participants were compared to all other children of the same age entering first grade. Again, program participants showed superior performance. Regression analyses of performance models showed higher coefficients for program participation than for other preschool experiences such as Headstart and or private preschool attendance. These findings support the conclusion that this type of program will augment existing programs to increase readiness skills and help prevent school failure. A cost-benefit analysis performed showed evidence of substantial financial savings in implementation of this program.

## Theoretical background

The importance of early childhood experiences in determining the course of later intellectual development has long been a topic of interest to psychologists. Cognitive development can be fostered by altering the early environment of a child; however, just how much change is possible and what aspects of the environment are most influential remain unsettled questions.

Headstart is the oldest, largest, and best known U.S. preschool program. Originally intended as a program for 3- and 4-year olds with parental involvement for disadvantaged youngsters, it has been found to be effective for raising educational attainment and decreasing special education costs (Lazar and Darlington, 1978; Lazar, et. al., 1982) Somewhat higher IQ scores were found for program participants relative to controls; however, these differences diminished and disappeared within three years of termination of the program. However, educational success as measured by numbers of retentions and special education placements, high-school graduation rates, and employment after high school showed significant positive effects for participants. More recently, however, as Headstart programs have become more numerous and the child poverty rates have grown, Headstart has been criticized for uneven levels of staff training and education, and program quality. As well, the growing child poverty rate has led to a lack of services for approximately 50% of those eligible, and in many areas, very few 3-year olds are served, turning Headstart into a 1-year program. Results from low-quality or brief programs have not been as encouraging as the early studies of model programs.

Recently, programs starting earlier than age 3 have been tried, on the theory that earlier intervention will have stronger effects for less cost and effort. Burton White's research on the Brookline Early Education Project [BEEP] found that educating middle class parents about human development and parenting techniques, starting at the birth of their first child, was significantly related to improved readiness for school, social skills, and psychological adjustment. BEEP parents also reported increased confidence and interest in their children's development, compared to those not

involved in the program. The New Parents as Teachers [NPAT] program of the Missouri Department of Elementary and Secondary Education was based on BEEP; similar results have been reported (Pfannenstiel & Seltzer, 1989). The Missouri program has been aimed at first-time parents, as they have not had the experience of having previous children. Both programs were aimed at traditional two-parent, middle-class families, and research reports include only studies on these types of families. White suggested that more intensive programs might be helpful for families who have higher needs than the average middle-class family (White (1988), pp.136-137; White (1979), p.182).

The Abecedarian project in North Carolina, an intensive, center-based intervention starting early in infancy, followed by a home-based resource program for the first 3 years of school, was designed for children from high-risk homes. Participants and controls were selected randomly at birth. After 3 years of school, participants had significantly fewer grade retentions and higher achievement test scores than controls, and had nearly the same retention rate as non-high risk, middle-class students who attended the same schools. Studies of the effects of each component of the program separately showed that the early component had more effect than the later one: high-risk children who attended just the preschool had much better achievement and retention rates than those who participated in the later school-home program (Horacek, et. al., 1987).

Another infant program designed to strengthen the family unit is the Family Support Intervention (Seitz, Rosenbaum, & Apfel, 1985), which provides coordinated medical and social services for impoverished mothers expecting their first child starting during the pregnancy and continuing until the child was 2-1/2 years old. Controls and participants were randomly selected at the time of the children's births. Participants' children showed higher levels of language development, IQ test scores, and school attendance and achievement at ages 2-1/2 and 5 years of age than controls. When the children were 10 years old, studies showed that participants' children had higher attendance, fewer adjustment problems, and special educational services characterized the experimental group,

although the other differences had disappeared. Participant mothers were more active in interacting with the schools, had fewer children, and were significantly more likely to have continued their education and be self-supporting those in the control group. In addition, participants' mother-child relationships were closer and more positive than those of controls. These results indicate significant, long-lasting effects in preventing school failure and costly special services and improving family economic status. However, this study excluded families with severe problems often typical of disadvantaged families: mothers with complications of pregnancy, unhealthy babies, adolescent mothers, and mothers with "marked" retardation or acute psychoses. Therefore, generalization to all disadvantaged families is of questionable validity.

The finding of closer affective relationships between mother and child in Horacek's study is intriguing in light of Estrada, et. al.'s (1987) finding that the affective quality of the mother-child relationship when the child is 4 years old is highly predictive of school readiness and IQ at age 6, and school achievement at age 12, in middle class families. Children with the most disrupted parent-child relations, victims of child abuse and neglect, perform more poorly in school than children well-treated by their parents (Eckenrode, Laird, & Doris, 1993). Brazelton (1990) has shown that support for and education of parents of high-risk new-born infants (low birth weight, developmentally delayed, etc.) has significant positive effects in the subsequent treatment and development of these children. Bowlby (1988) has also shown positive effects on personality development in children whose parents received social support to combat adverse conditions, such as loss of a spouse, unemployment, etc.

Other studies on disadvantaged populations (Weintraub and Palti (1991), Stone, Bendell, and Field (1988), and Madden, O'Hara, and Levenstein (1984)) found that the effects of infant programs decreased and disappeared within 3 years of the conclusion of these programs. However, all the programs studied lasted 2 years or less and were not coordinated with other services such as family support or speech therapy. In addition, experimental subjects were not completely matched to controls

on risk factors. This, combined with severe attrition, caused the experimental groups to be less advantaged than controls in the latter two studies. It is possible that the lower socio-economic status of the experimental group accounted for the lack of advantage over the controls.

## The PACT Program

The "Parents and Children Together" [PACT] program of Binghamton, New York, based on Missouri's NPAT program, was initiated in 1987 and has served over 500 families.[1] It is available to any City resident without cost, although it has been aimed at families with children at risk for school failure. Most families have been referred to the program by the Broome County Departments of Public Health and Social Services, or self-referred. A small number of families have been ordered to participate by family court in order to keep their children from being placed in foster care.

Trained and certified parent educators visit the families' homes at least once a month, starting when the child is born and continuing until he or she is 3 years old. Parent educators give the parents information about their child's development and demonstrate parenting techniques, e.g. disciplinary practices or activities to promote language development. They also refer parents to other agencies when appropriate, such as when medical or speech services are needed. The program also provides developmental screening tests for the children, parent group meetings, and a lending library of child development/parenting books, videos, and age-appropriate toys.

PACT was established with the goal of raising the number of children entering school with adequate levels of readiness skills. In the past, a high proportion of children in Binghamton have started school lacking readiness skills. The recent report of the National Commission on Children (1991) has documented the high number of children who have not achieved readiness, and the relationship of lack of readiness with high child poverty rates. Low-income families represent a high percentage of the population sending their children to the Binghamton Schools families of nearly

50% of all children currently entering first grade have low incomes, according to free and reduced-price lunch counts. PACT has been designed to be intensive and involve inter-agency cooperation because of the high proportion of children at risk for school failure in the enrolled families. Many referrals are made for other types of services, e.g. speech therapy, public health, etc. As well, follow-up service is provided for low-income children by Headstart and prekindergarten classes, some of which are provided at the same site as the PACT offices at MacArthur School. The combination of PACT and other services is designed to raise the reading readiness skills of participating children by the time they enter school. If these children have attained readiness skills, then they will be starting their school careers without the common handicap of starting behind their agemates and having to catch up to them. Presumably they will then experience greater success in their initial school experiences, resulting in fewer retentions in grade and fewer special education services needed. Success in the early grades should lay the foundation for improved school experiences in the later grades, eventually leading to greater educational attainment and future opportunities in life than is usual for children from high-risk families.

Studies on programs described earlier indicate that intensive, long-lasting programs may have a significant, long-lasting effect on intellectual and school performance, but do not give information on the relation between infant programs and other common preschool programs, such as Headstart and prekindergarten. In this report, the first stage of evaluation of the PACT program, we have investigated the effects of PACT, as well as combined effects of Headstart, PACT and prekindergarten, on the cognitive and physical development of high-risk children, as well as some aspects of their family lives which have been linked to poor school achievement both in early and later grades.

## Questions

This evaluation was designed to determine whether the combined PACT and other preschool programs were associated with improved developmental outcomes in the children of high-needs families compared to that observed in children from similar families who also amy have participated in the other programs (Headstart and/or prekindergarten) but not in PACT. As well, we wanted to explore how PACT affected family and societal relationships: Was it associated with a decrease in the incidence of maltreatment in participating families, as hoped? Was it associated with any change in the family's welfare status?

We also wanted to compare the costs and benefits of the program for the school district. Would it be likely to save the district money in the future? Is it a reasonable investment?

Study 1:

## Methods

### Subjects

Experimental group

Of the oldest PACT graduates, aged 4 and 5 years old, those with the highest risk of school failure were enrolled in prekindergarten in the Binghamton City School District in 1991-1992, half in a full-day program and the other half attending half-day programs. These included 21 children whose parents started participation in PACT between the time of the child's birth and first birthday. One child had to be excluded as his mother did not give permission for testing. This left the remaining 20 children as our experimental group. All children came from homes where English was spoken. Most families were referred by the Broome County Departments of Public Health and Social Services [DSS], or referred themselves. Five had enrolled under duress--threats that their children would be taken away and placed in foster care if they did not enroll in some type of parental program--and one

family had actually been ordered to participate by family court. Eighteen of the 20 families suffered from poverty, lack of education, teenaged parenthood, substance abuse, substandard housing, histories of child abuse and/or neglect, and/or a diagnosed delay in their child. Two children were in the custody of their grandmother and great-grandmother respectively, and many of the children lived with a single mother. Half of the children had attended center-based Headstart when they were three (1990-1991). Characteristics of the experimental group are shown in Table 1, on page 22.

Control group

A control child was then selected for each experimental child. The prekindergarten teachers and PACT personnel selected the controls by matching them for race, sex, educational experience: prekindergarten teacher and school, participation in Headstart; and the number of risk factors a counted by the New York State Education Department's Index of Need. This form records the parents' responses to questions by the school social worker as to the number of parents in the home, the mother's educational level, whether the family receives AFDC [Aid for Dependent Children, or welfare], food stamps, Medicaid, unemployment, or disability; eligibility for free or reduced lunch and day care subsidy; income below 200% of the poverty level; substandard, crowded, or temporary living conditions; the size of the family; chronic illness of the parent(s); foster home placement or surrogate parent; parent involvement in work, school, or training; whether the parents were teenagers at the time of the child's birth; and parental low school achievement. As well, suspected histories of substance abuse in the family reported in interactions between the family and program personnel were counted as risk factors for calculations. Each item is checked and the numbers of checks were counted to obtain a score for each child. Characteristics of this group are also shown in Table 1.

Comparison of each group as a whole

Characteristics of each group as a whole are very similar, as shown by Table 1. The average, standard deviation, and range of the age of the children, number of risk factors, number of parents in

the home, and mother's educational level were virtually identical. No significant differences were noted on these factors using t-tests to compare group means.

Differences between groups on other characteristics, including the number of children of each sex, race, Headstart participation, low family income, and AFDC status, teenaged parents, suspected substance abuse, and DSS-confirmed histories of child abuse and neglect were compared using chi-square tests. None of the differences between groups were significant. As noted above, there were somewhat more males, minorities, and Headstart participants in the experimental group. More control families reported receiving food stamps and being teenagers at the time of the child's birth; however, more experimental families reported having low incomes, and receiving free or reduced lunches and unemployment or disability payments.

DSS reported that more of the experimental than control families were receiving AFDC at the start of the program (1987-1988). Somewhat more experimental families had confirmed histories of child abuse and/or neglect at that time, as well. Neither difference was significant.

There was more suspected substance abuse among the families of the PACT group, although it did not achieve significance. This difference was thought to arise from the greater knowledge about the home that the school had because of PACT, not from any real difference between the groups.

The groups were similar in other ways. Eight out of the 20 control children's families enrolled in PACT for their younger children, but after our control subjects had turned three. These families were getting information about the development of the younger siblings, but no direct help with raising their older children who were our control subjects. This development should have contributed to our finding smaller differences between groups, and so does not decrease the validity of findings of differences.

## Procedure

Various areas of development were measured for each child, and experimental children were compared to their controls using an independent samples design. Children were assessed individually by an examiner who did not know the children or their families, and did not know who was in which group. Areas assessed for each child and measures included are described below.

Cognitive development was measured using the Kaufman Assessment Battery for Children [K-ABC] (1983) because it is designed to separate the measure of mental processing abilities from achievement measures. This separation is particularly helpful in assessing the abilities of disadvantaged children and others who are not from white, middle-class American culture. Most other intelligence tests mix achievement measures heavily dependent on cultural background with mental processing measures, thus obtaining falsely low scores for children from non-dominant cultural backgrounds. It was also used in the evaluations of the NPAT and BEEP programs, thus making comparisons between PACT and previous programs possible. Unfortunately, only about half of our subjects could be tested with the Kaufman before the school year ended (13 PACT graduates and 11 controls), due to a delay in receipt of the test.

All other tests were given to all subjects. Language development was measured using the Zimmerman Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979), resulting in a language age quotient comparing the child's language development with his/her chronological age. This test was also used in evaluations of previous programs.

Physical development was assessed using the fine motor and gross motor portions of the Denver Developmental Screening Test (Frankenburg & Dodds, 1969). This test screens for delays in these areas, and notes both definite and questionable delays. Questionable delays are noted as "cautions". For the purposes of comparison, the number of delays and cautions was totalled for each child, with delays assigned a value of 1 and cautions being assigned a value of .5.

Two aspects of family atmosphere were measured. At the time of testing, DSS statistics indicated that only one family in each group was confirmed to be involved in a case of child abuse and/or neglect which was "open", in other words, not resolved. The DSS was unable to give information on how many families had been investigated for suspected abuse and neglect because records are discarded when cases cannot be confirmed. Confirmation requires very substantial evidence, often unavailable in these cases. The evidence in many cases of abuse and neglect, therefore, is of a quality insufficient to substantiate claims, and so many cases, even severe ones, are not confirmed. When information provided in interactions between the family and school personnel indicated a likelihood of abuse and/or neglect, these were counted as a measure of suspected abuse and/or neglect for the purposes of this study.

The other measure of family atmosphere used was the proportion of change in AFDC status in each group. If a "welfare culture" affects educational achievement, then entering or leaving the welfare system might indicate a change in family atmosphere.

The results were analyzed using the Statistical Package for the Social Sciences [SPSS]. All frequency data were analyzed using the chi-square procedure. Group means were compared by t-tests using independent samples.

## Results

A summary of results is shown in Table 2, page 23. As mentioned above, the Kaufman was given to slightly more than half of our subjects due to time limitations. There were only 13 PACT children and 11 controls tested. Group means show an 8 point advantage for the PACT children on the Mental Processing subtests (102 v. 94). This difference, although relatively large, did not quite achieve significance, probably due to the small numbers of subjects tested. However, comparing the percentage of children below 90 on this test resulted in a significant difference between groups. On

the Achievement portion of the Kaufman, the PACT group had a mean advantage of 3 points, which was not significant. The two groups were similar in the percentage below 90 on this subtest.

All other tests involved the entire sample of 20 children in each group. The mean language age quotient on the Zimmerman Preschool Language Scale of the PACT graduates was 107; for the control children, it was 100. Using a separate estimate of variance for each group (independent samples) in a t-test, this difference was significant at the .05 level, one-tailed, df=38, using independent samples.

The difference between groups meant that 30% of the PACT graduates and 65% of the controls scored below the average score of 100 on the Zimmerman, a significant difference ($p < .05$). According to the test manual, a below-average score at age 4 predicts failure in reading readiness in this type of population, even if the child attends Headstart or kindergarten in the interim (Zimmerman, Steiner, and Pond, 1979). Therefore, twice as many PACT graduates as controls were predicted to be ready to learn how to read next year, avoiding special placement or retention in kindergarten or grade 1.

The number of delays and cautions on the Denver Developmental Screening Test for fine and gross motor skills combined averaged .4 (somewhat less than one caution) for the PACT graduates, and 1.3 for the controls. This difference was significant ($p < .05$, one-tailed, df=38).

Fine motor delays were slightly less numerous for the PACT children than for their controls; this difference was not significant. Gross motor delays, however, were far less common among the PACT population, both in the average number of delays per child and the number of children showing delays. These differences were highly significant ($p < .05$).

The number of children who had confirmed histories of abuse and neglect were equal by DSS figures (5 of 20 in each group). However, by school records, the number who were currently

suspected to be abused and neglected in the PACT group was half the number in the control group. This difference did not meet significance, however.

Changes in welfare status in the child's life showed significant differences between groups. Welfare dependence in both groups doubled between the time of the children's births and one year later. After that, however, welfare dependence declined in the PACT group: 40% of the families received AFDC when the children were one year old, but only 30% received it by the time of testing. During the same period, the number of control families receiving welfare increased: from 30% to 50%. This difference was not quite significant, p equalling .05 exactly.

Table 3 (page 24) shows regression coefficients for multiple and simple regression models of variables shown to have sizeable differences between groups. The first model for each dependent variable tests the combined associations between number of risk factors and participation in Headstart and/or PACT. The second model shows the best-fit model, excluding variables shown to have little association from the first model. Table 3 indicates that PACT participation has stronger associations with normal levels of cognitive, language, gross motor development, and termination of AFDC than does Headstart. These results should be considered tentative, however, as the Headstart participants in this study had substantially more welfare dependence, teenaged parents, substance abuse, and confirmed histories of child abuse and/or neglect than non-Headstart participants, and the number of subjects is very small. Further testing with more subjects is planned for the future.

Study 2:

## Methods

### Subjects

In this second study, the subjects were all children enrolled in kindergarten in the Binghamton City Schools for the first time in 1992-1993. Children who were repeating kindergarten in 1992-1993

were excluded, as they were significantly older than the PACT children. Children who had entered school after November, 1992, were also excluded, as attendance records did not reflect the winter, when most absences occur. As well, academic records were unavailable at one school (out of 7) during the time of data collection; this situation will be remedied in the fall, and so this part of the study should be considered an interim report, as there are about 80 children at this school who will be part of the study. In all, the records of 401 children were examined, including 37 whose families had participated in PACT starting when they were 12 months or younger in age. All statistics were reported in school records.

Comparison of groups:

Table 4 (page 25) shows that at birth, the PACT children, as a group, were significantly more likely to have been the products of pregnancies and deliveries involving complications, and were also more likely to have chronic medical conditions such as frequent ear infections or asthma, than the remainder of Binghamton kindergartners. There were also significantly more males, compared to females, in the PACT group. The PACT children had slightly lower mean birth weights than the other kindergartners, and there were slightly more who were considered to be of low birth weight (2500 g. or less). The numbers of minority and non-English speaking children were comparable between groups. The proportion of families on public assistance and cases of abuse and neglect in the two groups has not yet been reported, but will also be compared in the future. The statistics available now indicate that as a group, the PACT children were more likely to be at risk for poor school readiness due to their poorer health status.

## Results

Statistics on current characteristics yield somewhat different results. Similar to initial health statistics presented previously, Table 5 (page 25) shows that upon finishing kindergarten, PACT

children as a group had significantly more major illnesses, such as scarlet fever or pneumonia, or accidents requiring hospitalization reported, compared to other kindergartners. However, they were significantly more likely to have at least one parent working, according to the parents' statements. They were less likely to be eligible for free or reduced lunches, though not significantly so. The number of parents in the home was nearly identical for the two groups.

The two groups also differed somewhat in educational experiences: significantly more PACT children than others had attended prekindergarten classes in the City schools. Nearly the same number in each group had participated in Headstart. More PACT children had also attended other preschool programs, though not significantly so. About the same number had transferred between schools during kindergarten.

Table 6 (page 26) shows differences between the PACT and non-PACT children in academic performance in kindergarten. The PACT children attained significantly higher scores on the Brigance Kindergarten and Grade 1 Screening Test (Curriculum Associates, Inc., 1987), given at the beginning of kindergarten, as well as being significantly more likely to pass the reading readiness test given at the end of kindergarten. They also had significantly higher attendance and grades. They also had higher scores on, and were more likely to pass, the math readiness test given at the end of kindergarten, although these differences were not significant. Although PACT children were more likely to be receiving special educational services during kindergarten, they received fewer services per child involved in special education; thus the mean number of special educational services per child was nearly equal between the two groups. We are still analyzing this data for length of time receiving special services, as well as intensity and cost.

The results of a series of regression analyses done to determine the best models for dependent variables are shown in Table 7 (pages 27-28). Forward stepwise regressions were performed, and the results reveal PACT participation to be a more significant positive factor in predicting test scores and

grades than participation in other preschool programs when family poverty (as measured by free and reduced lunch counts), chronic medical conditions, high risk birth (measured by presence of complications of pregnancy and delivery or low birthweight), and sex are statistically controlled. In fact, the most significant factors in these models of school performance were family poverty, chronic medical conditions, high risk birth, and lack of PACT participation.

Participation in pre-K was associated with more negative outcomes for several variables; this result is likely to be due to the requirement that children be of high risk for future school failure for participation in pre-K (see Study 1), and reflects the population served by this program. Similarly, participation in other preschool programs often reflects higher family income levels, so its association with more positive outcomes seems likely to also to reflect the population served.

## Discussion and Conclusions

These results demonstrate that the combined services, early intervention PACT program is associated with fewer developmental delays and better school performance in high-risk children in both studies. It appears to be a valuable addition to the array of preschool programs available to high-risk families in preventing delays in the development of their children.

In Study 1, improved family relationships demonstrated by lower incidence of abuse and neglect were also associated with PACT participation. A possible reason may be the greater understanding of their children due to the program reported by PACT parents on exit surveys. This is an area which we intend to study further, particularly in light of earlier findings showing associations between improved family relationships and better developmental outcomes. It is possible that closer and more nurturing parent-child relationships lead to more cognitive and social stimulation and thus better cognitive, social, and physical development, as previous research cited in the introduction suggests.

Decreases in welfare dependence in the PACT families in Study 1 may indicate a greater tendency for these parents to seek control over their lives, due to improved self-confidence as parents and interest in their children's future. Previous studies of infant intervention programs have shown lower rates of welfare dependence when daycare has been provided. No daycare was provided by PACT, but the same effect was seen here. Perhaps the attention and care society has shown these parents via the PACT program has given them more interest in being part of the society at large, and has encouraged them to seek employment. It is also possible that since PACT is now open to all, and does include both working people and AFDC recipients, social networks form which help the AFDC recipients get jobs. We plan to explore this issue by further study.

These conclusions are based on subjects who voluntarily entered PACT. The proportion of parents compelled to enter PACT is increasing; further studies will determine whether similar results will be found with this population.

The reduced incidence of delays and better initial performance in the PACT children is expected to ease their transition into the educational system and reduce the amount of future special education and retentions in grade. Starting school at the expected level should also reduce future problems as well by avoiding the necessity to make up for inadequate preparation. Reduced costs for the school system should be the result. As well, the possibility that welfare dependence can be reduced would substantially reduce costs to the community. Tables 8 and 9 (page 29) show the relative costs of special services and estimated savings from Study 1. These figures are based on projections described below, but it should be noted that these are speculative at best, due to high individual variation and lack of exact prediction possible. Similar analyses for Study 2 are not yet complete, but will be done to confirm these results.

Table 8 shows that addition of PACT to existing Headstart and prekindergarten programs costs a small amount more per child. As mentioned previously, Table 3 indicated that PACT may add

significantly to the positive effects of Headstart, and may reduce risk factors which negatively influence a child's readiness for school.

The Zimmerman Preschool Language Scale was tested on 4-year old Headstart children when it was developed to determine the accuracy of prediction of reading readiness. A high degree of accuracy was demonstrated, as measured by the Lee Clark Reading Readiness Test after the children had completed kindergarten. Only 7% of the children who scored at the average level on the PLS (language age quotient= 100) and above scored below average on the reading readiness test (Zimmerman, Steiner, & Pond, 1979).

As can be seen in Table 2, 30% of the PACT graduates and 65% of the controls scored below average on the PLS. Therefore, 6 PACT children and 13 controls would be predicted to fail reading readiness tests given before entrance to first grade. If the associations seen indicate causal factors, PACT will have prevented 7 children from failure and placement in readiness classes. Placement in a readiness class generally involves at least one extra year in school for the child involved. An extra year of school for 4 children is expected to cost the district $15,149 allowing 3% inflation for the next 13 years, using the figures from Table 9. In addition, there are at least two children in the PACT group who have received speech therapy and have corrected their speech problems. Speech therapy when they got to the primary grades would cost $2788 per child, for a total of $5576. In addition, 3 more children in the control group have scored below 90 on the Kaufman Mental Processing subtest; these children are likely candidates for substantially separate classroom placement (60% service) for at least several years. Two more controls attained borderline scores on the Kaufman and the Zimmerman; these would be likely candidates for resource room services (20% service) for several years.

The total savings figure of $65,074 to $107,114 is almost certainly an underestimate of the true savings to be realized, as many children who go through the extra year of readiness class also

need special education in the form of option or resource classes later on, adding to the expense. As well, students who fail in the early grades are often the ones who later drop out of school and are at risk for teen pregnancy and low income in adulthood. These consequences cost society even more money than special education; for example, AFDC for a single mother with 2 children living in public housing cost $6972 in 1991-1992. Therefore, combining PACT with Headstart and prekindergarten appears to be an extremely cost-effective method of preparing high-risk children for entry into school and avoiding costly future problems.

We are following the progress of these children through school to determine whether these projections have been correct. It is possible that continued programs for these children when they are in school will be needed to maintain the gains demonstrated here. Peers and social environments become more influential in children's behavior as they get older, as home atmosphere and parents' behavior become somewhat less so. Therefore, the effects of a changed home environment are likely to have less influence on the child's achievement as the child gets older. As well, parents may need continued assistance in dealing with the needs and abilities, always changing, of their older children. The parenting skills necessary for dealing with toddlers are not necessarily the best ones to use with older children and adolescents. Some combination of home- and school-based programs would seem to be the best follow-up, based on previous research by Patterson (1982), Conger (1991), and others.

The best course to follow for children whose parents will not voluntarily enter programs like PACT needs further study. As more cases of families are being ordered by the courts to enter PACT are available to participate in the study, it will become more feasible to study this population, and determine whether the results found here apply to them as well.

As well, the question still remains whether the PACT program causes less reliance on AFDC and related programs, or whether PACT families are less likely to stay on welfare because of some other factor. We will explore this question further via interviews with the families and DSS.

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Table 1: Characteristics of PACT (Experimental) and Control Subjects, Study 1

| Group: | PACT | Control |
|---|---|---|
| Number in group | 20 | 20 |
| Child's age in months | 55 | 56 |
| Range (SD) | 51-61 (3) | 51-62 (4) |
| Sex: Male | 70% | 55% |
| Female | 30% | 45% |
| Race: Caucasian | 70% | 85% |
| Black | 20% | 5% |
| Hispanic | 10% | 5% |
| Asian | 0 | 5% |
| Participated in Headstart | 60% | 40% |
| Number of risk factors (SD) | 8 | 8 |
| Range (SD) | 1-14 (4) | 0-14 (4) |
| Number of parents in home[1] | 1.5 | 1.3 |
| SD | (.6) | (.4) |
| Mother's years of education | 11.3 | 11.3 |
| Range (SD) | 9-12 (1.2) | 8-14 (1.5) |
| Teen parents at birth | 50% | 65% |
| DSS statistics on numbers of families: | | |
| AFDC in 1987 | 20% | 15% |
| AFDC in 1988 | 40% | 30% |
| Child abuse and neglect cases: | | |
| Confirmed history before 1987 | 10% | 5% |
| Family receives, by self-report: | | |
| Food stamps | 60% | 85% |
| Medicaid | 75% | 80% |
| Free or reduced lunch | 100% | 90% |
| Unemployment or disability | 15% | 5% |
| Income <200% of poverty level | 60% | 50% |
| Substance abuse suspected | 35% | 20% |

Note: No significant differences were found between groups at the $p<.05$ level. One-tailed t-tests were used for comparing group means, and chi-square tests were used for frequencies.

1. Fathers who were present at times were scored as .5.

Table 2: Results of T-Tests, Study 1

| Variable: | Group Exp. [PACT] | Control | t | p |
|---|---|---|---|---|
| Mental Processing[1]-Kaufman ABC | | | | |
| Mean | 102 | 94 | -1.55 | .14 |
| SD | (10) | (15) | | |
| Minimum | 90 | 72 | | |
| Maximum | 118 | 114 | | |
| % below 90 | 5% | 25% | 4.53 | .03* |
| Achievement[1]-Kaufman ABC | | | | |
| Mean | 97 | 94 | -.72 | .48 |
| SD | (12) | (11) | | |
| Minimum | 75 | 77 | | |
| Maximum | 121 | 112 | | |
| % below 90 | 25% | 20% | .01 | .92 |
| Language Acquisition Quotient-Zimmerman Preschool Language Scale | | | | |
| Mean | 107 | 100 | 1.78 | .04* |
| SD | (11) | (13) | | |
| Minimum | 85 | 72 | | |
| Maximum | 127 | 127 | | |
| % below age level | 30% | 65% | 4.91 | .03* |
| Fine Motor Delays-Denver Developmental Screening Test | | | | |
| Mean | .3 | .5 | -.61 | .27 |
| SD | (.7) | (.6) | | |
| Minimum | 0.0 | 0.0 | | |
| Maximum | 2.0 | 2.0 | | |
| % below age level | 25% | 40% | 1.02 | .31 |
| Gross Motor Delays-Denver Developmental Screening Test | | | | |
| Mean | .1 | .9 | -2.33 | .02* |
| SD | (.3) | (1.4) | | |
| Minimum | 0.0 | 0.0 | | |
| Maximum | 1.5 | 4.5 | | |
| % below age level | 10% | 45% | 6.14 | .01* |
| Abuse and/or Neglect-DSS and School records | | | | |
| Confirmed cases 1987-1992 | 25% | 25% | | |
| Cases remaining open | 5% | 5% | | |
| Current suspected cases | 25% | 50% | 2.66 | .10 |
| AFDC status changes-DSS records | | | | |
| AFDC at present | 30% | 50% | | |
| Months receiving AFDC | 18 | 22 | | |
| Change in AFDC status | -10% | +20% | 5.83 | .05 |

Note: * $p < .05$. All probabilities for t-tests are one-tailed; those for $\chi^2$ are two-tailed.
1. Only 13 PACT and 11 control children tested on the Kaufman. All 40 children included in remaining tests, 20 in each group. df=22 for tests on the Kaufman; df=38 on the other tests.

Table 3: Regression Coefficients for Best Models, Study 1

| Dependent variable: Mental Processing Subtest Score below 90 | | | | |
|---|---|---|---|---|
| Model 1: | | | | |
| Independent variable: | Beta | p | R | P of F |
| PACT | -.44 | .03* | .56 | .05 |
| HS | .35 | .12 | | |
| Risk factors | .02 | .92 | | |
| Model 2: | | | | |
| PACT | -.43 | .03* | .43 | .03* |
| **Dependent variable: Language Below Age Level** | | | | |
| Model 1: | | | | |
| PACT | -.38 | .02* | .39 | .11 |
| HS | .18 | .28 | | |
| Risk factors | -.09 | .59 | | |
| Model 2: | | | | |
| PACT | -.35 | .03* | .35 | .03* |
| **Dependent variable: Presence of Gross Motor Delay** | | | | |
| Model 1: | | | | |
| Independent variable: | Beta | p | R | P of F |
| Risk factors | .44 | .00* | .59 | .00* |
| PACT | -.33 | .02* | | |
| HS | -.19 | .19 | | |
| Model 2: | | | | |
| Risk factors | .40 | .01* | .56 | .00* |
| PACT | -.36 | .01* | | |
| **Dependent variable: Change in AFDC Status** | | | | |
| Model 1: | | | | |
| PACT | -.36 | .03* | .38 | .13 |
| HS | .17 | .29 | | |
| Risk factors | .01 | .97 | | |
| Model 2: | | | | |
| PACT | -.34 | .03* | .34 | .03* |

Note: * denotes significance, $p<.05$. Constants not printed. df=38 for the regressions on all dependent variables except Mental Processing. All variables dichotomous except change in AFDC status, which had 3 values (initiating AFDC, termination of AFDC, or remaining the same) and the number of risk factors, which was continuous.

Table 4: Characteristics of PACT (Experimental) Children at Birth v. All Others, Study 2

| | Exp. [PACT] (N=37) | All Others (N=444) |
|---|---|---|
| Mean birthweight (SD) | 118 (21) | 119 (23) |
| Proportion of low birthweight (2500 g. or less) | 10.8% | 7.4% |
| Proportion of complicated pregnancies or deliveries | 43.2%$_a$ | 21.6%$_b$ |
| Mean number of chronic medical conditions (SD) | .73 (1.05)$_c$ | .40 (.86)$_d$ |
| Proportion of males to females | 67.6%$_e$ | 47.8%$_f$ |
| Proportion of minorities | 16.2% | 17.2% |
| Proportion of non-English native language | 5.4% | 7.1% |

Note: Different subscripts denote significant differences between groups at the p<.05 level. One-tailed t-tests were used for comparing group means, and chi-square tests were used for frequencies. SD denotes standard deviation.

Table 5: Current Characteristics of PACT v. Other Children, Study 2

| | Exp. [PACT] (N=37) | All Others (N=444) |
|---|---|---|
| Medical characteristics: | | |
| Number of major illnesses or accidents (SD) | .70 (1.10)$_a$ | .41 (.85)$_b$ |
| Family and economic conditions: | | |
| Number of parents in home (SD) | 1.59 (.55) | 1.50 (.54) |
| Proportion with least one parent or guardian employed | 83.8%$_c$ | 67.3%$_d$ |
| Proportion eligible for free or reduced lunch | 45.9% | 59.4% |
| Educational experience: | | |
| Proportion in Headstart | 18.9% | 17.9% |
| Proportion in Bing. Pre-K | 32.4%$_e$ | 19.0%$_f$ |
| Proportion in other preschools | 32.4% | 24.8% |
| Number of other kindergartens attended (SD) | .16 (.37) | .14 (.41) |

Note: Different subscripts denote significant differences between groups at the p<.05 level. One-tailed t-tests were used for comparing group means, and chi-square tests were used for frequencies. SD denotes standard deviation.

Table 6: School Performance in Kindergarten, Study 2

| | Exp. [PACT] (N=37) | All Others (N=444) |
|---|---|---|
| Kindergarten readiness: | | |
| Mean Brigance Test score (SD) | 90.6% (7.9)$_a$ | 84.9% (14.9)$_b$ |
| First grade readiness: | | |
| Mean reading test score (SD) | 89.5% (19.5) | 85.5% (20.6) |
| Proportion failing test | 12.1%$_c$ | 27.5%$_d$ |
| Mean math test score (SD) | 87.8% (21.2) | 81.8% (26.2) |
| Proportion failing test | 12.1% | 20.1% |
| Other performance measures: | | |
| Total days absent (SD) | 11.3 (13.7)$_e$ | 12.1 (9.8)$_f$ |
| Grade point average (SD) | 95.1% (7.8)$_g$ | 92.3% (10.1)$_h$ |
| Special educational services: | | |
| Mean number of special educational received per child | .29 (.71) | .24 (.84) |
| Proportion receiving special educational services | 16.2% | 10.4% |
| Number of special educational services received per child receiving them (SD) | 1.7 (.8) | 2.3 (1.5) |

Note: Different subscripts denote significant differences between groups at the $p<.05$ level. One-tailed t-tests were used for comparing group means, and chi-square tests were used for frequencies. SD denotes standard deviation.

Table 7: Regression Coefficients for Best Models, Study 2

| Dependent variable: Brigance Test score | | | | |
|---|---|---|---|---|
| Significant independent variables: | Beta | p | R | P of F |
| Free or reduced lunch eligible | -.197 | .001 | .436 | .000 |
| No. of chronic medical conditions | -.227 | .000 | | |
| Participation in other preschool | .190 | .001 | | |
| Participation in PACT | .110 | .029 | | |
| Being male | -.102 | .042 | | |
| **Dependent variable: Reading readiness test score** | | | | |
| Significant independent variables: | Beta | p | R | P |
| Free or reduced lunch eligible | -.275 | .000 | .429 | .000 |
| No. of chronic medical conditions | -.222 | | | |
| Participation in Bing. Pre-K | -.126 | | | |
| Being male | -.095 | | | |
| Not-quite significant variables: | | | | |
| Participation in other preschools | -.096 | .066 | | |
| Participation in PACT | .088 | .066 | | |
| No. of other kindergartens attended | -.080 | .092 | | |
| **Dependent variable: Failing reading readiness** | | | | |
| Significant independent variables: | Beta | p | R | P |
| Free or reduced lunch eligible | .258 | .000 | .466 | .000 |
| No. of chronic medical conditions | .243 | .000 | | |
| Participation in Bing. Pre-K | .195 | .000 | | |
| Participation in PACT | -.137 | .005 | | |
| **Dependent variable: Math readiness test score** | | | | |
| Significant independent variables: | Beta | p | R | P |
| Free or reduced lunch eligible | -.227 | .000 | .403 | .000 |
| No. of chronic medical conditions | -.198 | .000 | | |
| Participation in Bing. Pre-K | -.154 | .002 | | |
| Participation in PACT | .115 | .019 | | |
| Complications of preg. or delivery | -.099 | .047 | | |
| Not-quite significant independent variables: | | | | |
| No. of other kindergartens attended | -.085 | .079 | | |
| **Dependent variable: Failing math readiness** | | | | |
| Significant independent variables: | Beta | p | R | P |
| Free or reduced lunch eligible | .227 | .000 | .360 | .000 |
| No. of chronic medical conditions | .141 | .005 | | |
| Participation in Bing. Pre-K | .142 | .005 | | |
| Complications of preg. or delivery | .106 | .036 | | |
| Not-quite significant independent variables: | | | | |
| Participation in PACT | -.197 | .051 | | |
| **Dependent variable: Total days absent** | | | | |
| Significant independent variables: | Beta | p | R | P |
| Free or reduced lunch eligible | .189 | .000 | .189 | .000 |
| Not-quite significant independent variables: | | | | |
| Low birth weight | .098 | .064 | | |

Dependent variable: Kindergarten grades

| Significant independent variables: | Beta | p | R | P |
|---|---|---|---|---|
| Free or reduced lunch eligible | -.187 | .001 | .306 | .000 |
| No. of chronic medical conditions | -.179 | .001 | | |
| Total days absent | -.114 | .031 | | |

Not-quite significant independent variables:

| | | |
|---|---|---|
| Participation in PACT | .088 | .092 |

Dependent variable: Mean number of special educational services per child

| Significant independent variables: | Beta | p | R | P |
|---|---|---|---|---|
| No. of chronic medical conditions | .416 | .061 | .479 | .000 |
| Participation in Bing. Pre-K | .128 | .010 | | |
| Free or reduced lunch eligible | .110 | .025 | | |

Not-quite significant independent variables:

| | | |
|---|---|---|
| Participation in PACT | -.091 | .061 |

Dependent variable: Receiving special educational services

| Significant independent variables: | Beta | p | R | P |
|---|---|---|---|---|
| No. of chronic medical conditions | .449 | .000 | .484 | .000 |
| Free or reduced lunch eligible | .139 | .002 | | |
| Being male | .118 | .009 | | |

Note: Forward stepwise regressions produced these models, using the following independent variables: Continuous numerical variables included number of chronic medical conditions, total days absent, number of parents in home, number of other kindergartens attended. Dummy variables included: sex, minority group membership, free or reduced lunch eligibility, low birth weight or complications of pregnancy or delivery, having at least one custodial parent or guardian employed, native language English, participation in PACT, Headstart, Binghamton City School District Pre-K, other preschools. Independent variables are listed as not-quite significant if $p<.010$. Of dependent variables, all are continuous and numerical except failure of readiness tests and receiving special educational services, which were made into dummy variables for these analyses.

Table 8: Cost for Special Services

| Program: | Cost per child |
|---|---|
| School costs: | |
| PACT | $1628 |
| Regular education | $2579 |
| Primary special education extra costs: | |
| Substantially separate (option) class (60% service) | $3911 |
| Resource room (20% service) | $896 |
| Speech therapy twice a week | $496 |
| Community costs: | |
| AFDC | $6972 |

Source: Binghamton City School District and Broome County DSS, 1991-1992.

Note: Costs are in 1991-1992 dollars, using a 3% projected annual inflation rate to calculate future costs. AFDC costs are calculated based on actual figures, unchanged since 1990, for an average AFDC family consisting of a single mother with 2 children living in public housing.

Table 9: Total Costs and Projected Savings for PACT, Study 1

| Program: | Total Cost | Savings |
|---|---|---|
| PACT | $32,560 | |
| Extra year of school avoided-4 children | | $15,149 |
| Speech therapy avoided-2 children | | $5576 |
| Resource room avoided-2 children, 3 years | | $5876 |
| Subst. sep. class avoided-3 children, 3 years | | $38,472 |
| 6 years | | $80,512 |
| Total | $32,560 | $65,074-$107,114 |

Source: Binghamton City School District and Broome County DSS, 1991-1992. All costs and savings given in 1991-1992 dollars, with 3% annual inflation projected.

1. PACT was the first program of its type in New York State operating in public education, and has been cited as an Exemplary Program by the American Administrators and Superintendents Association [AASA]. It was also awarded a National Education Certificate of Merit by Secretary of Education Lamar Alexander in 1991.